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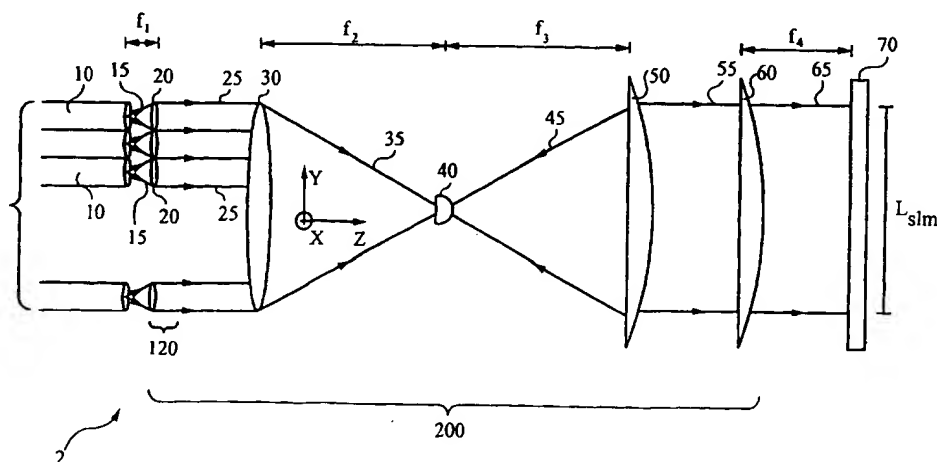
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(54) Title: AN ILLUMINATION SYSTEM FOR ONE-DIMENSIONAL SPATIAL LIGHT MODULATORS EMPLOYING MULTIPLE LIGHT SOURCES



(57) Abstract: The present invention is directed to illuminating a one-dimensional spatial light modulator (70) using an illumination system employing multiple light sources (10). The illumination system comprises a parallel array of light sources which provides a plurality of light outputs to an optical train (200). The optical train effectively combines the light sources into a single light source. The single light source provides a single light output for uniformly illuminating the spatial light modulator. The optical train includes a first optical train for receiving the light outputs from each light source, magnifying each light output, and overlaying each of the light outputs to form a single real magnified image. A mode conversion lens receives the single real magnified image, converts a mode profile of the single real magnified image into a top hat mode profile, and outputs a diverging light beam with a top-hat mode profile. A second optical train shapes the light beam into an appropriate spatial geometry in such a manner that the light beam effectively illuminates the entire spatial light modulator, and directs the light beam onto the spatial modulator.

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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 923 475 A (KESSLER DAVID ET AL) 13 July 1999 (1999-07-13) column 3, line 46 -column 5, line 40; figure 1 column 6, line 54 -column 7, line 20 column 11, line 1 - line 26 ---	1,2,4-9, 11, 13-15, 17-22
X	EP 1 040 927 A (EASTMAN KODAK CO) 4 October 2000 (2000-10-04) page 3, line 16 - line 23 page 4, line 5 - line 35; figures 1,2 ---	1-3
X	EP 1 003 071 A (EASTMAN KODAK CO) 24 May 2000 (2000-05-24) column 8; figure 1A ---	1,3,13, 18,22
	--- -/-	



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Patent family members are listed in annex.

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>US 6 084 626 A (RAMANUJAN SUJATHA ET AL) 4 July 2000 (2000-07-04)</p> <p>column 5, line 60 -column 7, line 22; figure 1</p> <p>-----</p>	<p>1-4, 8-13, 17, 18, 21, 22</p>

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 5923475	A	13-07-1999	DE	19751106 A1	28-05-1998
			JP	10175325 A	30-06-1998
EP 1040927	A	04-10-2000	US	6169565 B1	02-01-2001
			EP	1040927 A2	04-10-2000
			JP	2000313141 A	14-11-2000
EP 1003071	A	24-05-2000	US	6215547 B1	10-04-2001
			EP	1003071 A2	24-05-2000
			JP	2000272170 A	03-10-2000
US 6084626	A	04-07-2000	DE	19918391 A1	04-11-1999
			JP	11337891 A	10-12-1999